```
Set     Items   Description
S1        255   AU=(KING K? OR KING, K? OR ANGELOS, E? OR ANGELOS E?)
S2     545031   COIL? ?
S3     627241   SENSITI???????
S4       1637   S2(3N)S3
S5          4   S4 AND S1
S6          4   IDPAT (sorted in duplicate/non-duplicate order)
S7          3   IDPAT (primary/non-duplicate records only)
?  show files
File 347:JAPIO Oct 1976-2003/Apr(Updated 030804)
         (c) 2003 JPO & JAPIO
File 348:EUROPEAN PATENTS 1978-2003/Jul W03
         (c) 2003 European Patent Office
File 349:PCT FULLTEXT 1979-2002/UB=20030731,UT=20030724
         (c) 2003 WIPO/Univentio
File 350:Derwent WPIX 1963-2003/UD,UM &UP=200350
         (c) 2003  Thomson Derwent
?
```

7/9/1 (Item 1 from file: 350)
DIALOG(R)File 350:Derwent WPIX

015148957 **Image available**
WPI Acc No: 2003-209484/200320
XRPX Acc No: N03-166995
Nuclear magnetic resonance imaging method for medical application, involves computing sensitivity matrix from coil sensitivity image data acquired from local coils adjacent to target
Patent Assignee: KING K F (KING-I); GE MEDICAL SYSTEMS GLOBAL TECHNOLOGY CO (GENE)
Inventor: **KING K F**
Number of Countries: 001 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 20020171422	A1	20021121	US 2001851775	A	20010509	200320	B
US 6559642	B2	20030506	US 2001851775	A	20010509	200338	

Priority Applications (No Type Date): US 2001851775 A 20010509
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 20020171422	A1		9	G01V-003/00	
US 6559642	B2			G01V-003/00	

Abstract (Basic): US 20020171422 A1
NOVELTY - Calibration data and image data are acquired from N local coils positioned near the patient anatomy, using a pulse train. A **coil sensitivity** image for each **coil** is calculated using the calibration images which are reconstructed with the calibration data. A sensitivity matrix (S) is formed from the **coil sensitivity** images. A proton distribution image is formed based on the sensitivity matrix and an image that is reconstructed from the image data.
DETAILED DESCRIPTION - An INDEPENDENT CLAIM is included for sensitivity matrix formation method.
USE - For acquiring nuclear magnetic resonance imaging (MRI) data using sensitivity encoding (SENSE) technique, in medical applications.
ADVANTAGE - By using the sensitivity matrix in a sensitivity encoding technique, to reconstruct the MR image acquired with the local coils, the image reconstruction time is reduced.
DESCRIPTION OF DRAWING(S) - The figure shows the flowchart explaining the magnetic resonance imaging process.
pp; 9 DwgNo 3/3
Title Terms: NUCLEAR; MAGNETIC; RESONANCE; IMAGE; METHOD; MEDICAL; APPLY; COMPUTATION; SENSITIVE; MATRIX; COIL; SENSITIVE; IMAGE; DATA; ACQUIRE; LOCAL; COIL; ADJACENT; TARGET
Derwent Class: S01; S03; S05
International Patent Class (Main): G01V-003/00
File Segment: EPI
Manual Codes (EPI/S-X): S01-E02A2; S01-H01; S03-E07A; S05-D02B

7/9/2 (Item 2 from file: 350)
DIALOG(R)File 350:Derwent WPIX

015105669 **Image available**
WPI Acc No: 2003-166186/200316
XRPX Acc No: N03-131259
2D slice image generation method for magnetic resonance imaging system, involves multiplying inverted sensitiveness matrix by intensity matrix to

generate spin density matrix

Patent Assignee: GE MEDICAL SYSTEMS GLOBAL TECHNOLOGY CO (GENE); KING K F (KING-I)

Inventor: **KING K F**

Number of Countries: 028 Number of Patents: 004

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 20020167316	A1	20021114	US 2001855105	A	20010514	200316	B
US 6486671	B1	20021126	US 2001855105	A	20010514	200316	
EP 1260826	A2	20021127	EP 2002253251	A	20020509	200316	
JP 2002345780	A	20021203	JP 2002136425	A	20020513	200316	

Priority Applications (No Type Date): US 2001855105 A 20010514

Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 20020167316	A1		13	G01V-003/00	
US 6486671	B1			G01V-003/00	
EP 1260826	A2	E		G01R-033/3415	
	Designated States (Regional): AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI TR				
JP 2002345780	A		13	A61B-005/055	

Abstract (Basic): US 20020167316 A1

NOVELTY - The **sensitivities** of **coils** in multiple receiver coil MRI system are identified and arranged to form a sensitivities matrix S' for each pixel. The intensities of the respective coils are arranged corresponding to the image pixel, into an intensity matrix. The sensitivities matrix is modified, inverted and multiplied by the intensity matrix to generate a spin densities matrix including unwrapped pixel spin densities corresponding to the pixel.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is included for MRI image quality improvement apparatus.

USE - For generating two dimensional (2D) slice image in multiple receiver coil magnetic resonance imaging (MRI) system used in medical applications especially in patient positioning system.

ADVANTAGE - Reduces the noise in unwrapped image by modifying the **coil sensitivity** matrix and using the modified matrix to determine the spin densities of image pixels.

DESCRIPTION OF DRAWING(S) - The figures show the schematic view of the k-space raster and magnet assembly.

pp; 13 DwgNo 2, 3, 4/7

Title Terms: SLICE; IMAGE; GENERATE; METHOD; MAGNETIC; RESONANCE; IMAGE; SYSTEM; MULTIPLICATION; INVERT; MATRIX; INTENSITY; MATRIX; GENERATE; SPIN ; DENSITY; MATRIX

Derwent Class: P31; S01; S03; S05; T01

International Patent Class (Main): A61B-005/055; G01R-033/3415; G01V-003/00

International Patent Class (Additional): G01R-033/54; G01R-033/561

File Segment: EPI; EngPI

Manual Codes (EPI/S-X): S01-E02A2A; S01-E02A8C; S03-E07A; S05-D02B2; T01-J04C; T01-J10A; T01-J10B1; T01-J10C4B

?

7/TI,AB,AN,AU,PN,PD,AD,K/3 (Item 3 from file: 348)
DIALOG(R)File 348:(c) 2003 European Patent Office. All rts. reserv.

MRI acquisition method using the SENSE technique
Magnetresonanzbildgebung mit dem SENSE-Verfahren
Imagerie par resonance magnetique avec la technique SENSE

INVENTOR:
King, Kevin Franklin , 15651 West Ridge Road, New Berlin, Wisconsin 53151, (US)
Angelos, Elisabeth Carol , 923 Parkview Street, Hartland, Wisconsin 53029, (US

PATENT (CC, No, Kind, Date): EP 1293794 A2 030319 (Basic)
APPLICATION (CC, No, Date): EP 2002256324 020912;
PRIORITY (CC, No, Date): US 952446 010914

ABSTRACT EP 1293794 A2
A sensitivity encoding method (SENSE) is used to acquire an MR image having a reduced field of view. The number of aliased replicates caused by surrounding object boundaries is calculated for each image pixel location to obtain optimal aliasing artifact suppression without reducing image SNR.

INVENTOR:
King, Kevin Franklin ...

...US)
Angelos, Elisabeth Carol ...

...SPECIFICATION intensity may be expressed as: where j refers to coil number, sj))(y) is the **sensitivity** of **coil** j, m(y) is the spin density (including relaxation effects), D is the reduced phase...

...R) and A is the number of aliased replicates at the pixel. If the local **coil sensitivities** Sj))(y) are known, and if N = R, the proton distribution M(y) can...pseudoinverse of S. Denoting the complex conjugate transpose of S as S* then
Typically, the **coil** sensitivity values Sj))(y) are obtained by performing two calibration scans. The calibration scans are performed...

...and data from the second calibration scan is acquired using each of the N local **coils** . The B1 field **sensitivity** of each local **coil** is obtained by taking the ratio of the complex calibration images acquired with the body...

...calibration images obtained with surface coil j and the calibration image acquired with the body **coil** , the **sensitivity** of the surface **coil** j is estimated as
Note that the complex magnetization term M(y) drops out of...128X128 array of complex pixel intensity values for each slice 14 acquired by each local **coil** . The **sensitivity** Sj))(y) for each local coil j is then calculated at process block 210. in one preferred embodiment the local **coil sensitivity** Sj))(y) is calculated as follows: where N is the number of local coils and...

...factors in the denominator are positive definite.
Both of these methods for calculating the local **coil sensitivity** Sj))(y) in essence calculate the ratio of the calibration image intensity of the local...

...forth above in equation (6), the sensitivity matrix S is formed by combining the separate **coil sensitivities** Sj))(y) into a single matrix. The alias replication factor A in the sensitivity matrix...in each of the prescribed, reduced FOV slice images. These values are used in the **coil sensitivity** matrix S for each pixel location.

As indicated at process block 214 in Fig. 3...object boundary disposed outside the field of view of the prescribed image;

e) calculate a **coil** sensitivity image (210) for each local coil using the calibration images;

f) calculating an aliasing replicate...

...the location of the object boundary;

g) forming a sensitivity matrix S (212) from the **coil sensitivity** images and the calculated aliasing replicate numbers A;

h) reconstructing images I (214) from the...

...CLAIMS object boundary disposed outside the field of view of the prescribed image;

e) calculate a **coil sensitivity** image (210) for each local coil using the calibration images;

f) calculating an aliasing replicate...

...the location of the object boundary;

g) forming a sensitivity matrix S (212) from the **coil sensitivity** images and the calculated aliasing replicate numbers A;

h) reconstructing images I (214) from the...

?

```
Set     Items   Description
S1    1649230   MRI OR MAGNETIC(W)RESONANC? OR NMR OR FTNMR OR FTMRI OR MA-
            GNETORESONANCE  OR PMR OR PROTON(W)MAGNETIC(W)RESONAN? OR MR(
            )(IMAGE OR IMAGING) OR MRA OR MRS
S2       5713   IC=(G01R-003 OR G01N-024/08 OR G01V-003/175 OR G01V-003/00
            )
S3       5228   MC=(S01-E02A2 OR S03-E07A OR S01-E02A8A OR S01-E02A1 OR S0-
            3-E07C OR S05-D02B1 OR S03-C02F1)
S4       5380   CC=(A87601 OR B7510N)
S5    1651334   S1:S4
S6   34431583   CALCULAT? OR DETERMIN? OR ESTIMAT? OR ANALY? OR EVALUAT? OR
             ASSESS?
S7     646380   COIL? ?
S8    3864557   SENSITI???????
S9   19714750   LOCAT? OR POSITION? OR FIND???? OR DETECT? OR IDENTI?????
S10      3810   (EDGE? ? OR FITTING? ? OR FIT? ?)(3N)PIXEL?
S11      2218   S7(3N)S8
S12       864   S6 AND S11
S13       403   S12 AND S5
S14       202   S6(6N)S11
S15      1040   S9(6N)S10
S16         0   S14 AND S15 AND S5
S17       102   S14 AND S5
S18         0   S17 AND S10
S19         0   S15 AND S14
S20       158   S6(3N)S11
S21        85   S20 AND S5
S22        46   RD (unique items)
?  show files
File 155:MEDLINE(R) 1966-2003/Aug W1
         (c) format only 2003 The Dialog Corp.
File   2:INSPEC 1969-2003/Jul W4
         (c) 2003 Institution of Electrical Engineers
File   5:Biosis Previews(R) 1969-2003/Jul W4
         (c) 2003 BIOSIS
File   6:NTIS 1964-2003/Aug W1
         (c) 2003 NTIS, Intl Cpyrght All Rights Res
File   8:Ei Compendex(R) 1970-2003/Jul W4
         (c) 2003 Elsevier Eng.  Info. Inc.
File  73:EMBASE 1974-2003/Jul W4
         (c) 2003 Elsevier Science B.V.
File  94:JICST-EPlus 1985-2003/Jul W4
         (c)2003 Japan Science and Tech Corp(JST)
File  35:Dissertation Abs Online 1861-2003/Jul
         (c) 2003 ProQuest Info&Learning
File 144:Pascal 1973-2003/Jul W3
         (c) 2003 INIST/CNRS
File 105:AESIS 1851-2001/Jul
         (c) 2001 Australian Mineral Foundation Inc
File  99:Wilson Appl. Sci & Tech Abs 1983-2003/Jun
         (c) 2003 The HW Wilson Co.
File  58:GeoArchive 1974-2003/May
         (c) 2003 Geosystems
File  34:SciSearch(R) Cited Ref Sci 1990-2003/Jul W4
         (c) 2003 Inst for Sci Info
File 434:SciSearch(R) Cited Ref Sci 1974-1989/Dec
         (c) 1998 Inst for Sci Info
File 292:GEOBASE(TM) 1980-2003/Aug
         (c) 2003 Elsevier Science Ltd.
File  89:GeoRef 1785-2003/Aug B1
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?

22/9/1 (Item 1 from file: 155)
DIALOG(R)File 155:MEDLINE(R)

15144588 22652260 PMID: 12768534
A wavelet-based approximation of surface coil sensitivity profiles for correction of image intensity inhomogeneity and parallel imaging reconstruction.
Lin Fa-Hsuan; Chen Ying-Jui; Belliveau John W; Wald Lawrence L
Harvard-Massachusetts Institute of Technology Division of Health Sciences and Technology, Cambridge, Massachusetts, USA. fhlin@mit.edu
Human brain mapping (United States) Jun 2003, 19 (2) p96-111, ISSN 1065-9471 Journal Code: 9419065
Document type: Journal Article
Languages: ENGLISH
Main Citation Owner: NLM
Record type: Completed
Subfile: INDEX MEDICUS
We evaluate a wavelet-based algorithm to **estimate** the **coil sensitivity** modulation from surface **coils** . This information is used to improve the image homogeneity of **magnetic resonance** imaging when a surface coil is used for reception, and to increase image encoding speed by reconstructing images from under-sampled (aliased) acquisitions using parallel **magnetic resonance** imaging (**MRI**) methods for higher spatiotemporal image resolutions. The proposed algorithm **estimates** the spatial **sensitivity** profile of surface **coils** from the original anatomical images directly without using the body coil for additional reference scans or using coil position markers for electromagnetic model-based calculations. No prior knowledge about the anatomy is required for the application of the algorithm. The **estimation** of the **coil sensitivity** profile based on the wavelet transform of the original image data was found to provide a robust method for removing the slowly varying spatial sensitivity pattern of the surface coil image and recovering full FOV images from two-fold acceleration in 8-channel parallel **MRI** . The results, using bi-orthogonal Daubechies 97 wavelets and other members in this family, are evaluated for T1-weighted and T2-weighted brain imaging.

Tags: Human
Descriptors: Image Enhancement--instrumentation--IS; *Image Enhancement --methods--MT; * **Magnetic** Resonance Imaging--instrumentation--IS; * **Magnetic Resonance** Imaging--methods--MT; Algorithms; Artifacts; Brain --physiology--PH; Image Processing, Computer-Assisted--instrumentation--IS; Image Processing, Computer-Assisted--methods--MT
Record Date Created: 20030527
Record Date Completed: 20030725

22/9/3 (Item 3 from file: 155)
DIALOG(R)File 155:MEDLINE(R)

09945623 21859603 PMID: 11870841
Combination of signals from array coils using image-based estimation **of** coil sensitivity **profiles.**
Bydder M; Larkman D J; Hajnal J V
Robert Steiner MR Unit, MRC Clinical Sciences Centre, Imperial College School of Medicine, Hammersmith Hospital, London, UK.
Magnetic resonance in medicine - official journal of the Society of Magnetic Resonance in Medicine / Society of Magnetic Resonance in Medicine (United States) Mar 2002, 47 (3) p539-48, ISSN 0740-3194

Journal Code: 8505245
Document type: Journal Article
Languages: ENGLISH
Main Citation Owner: NLM
Record type: Completed
Subfile: INDEX MEDICUS

It is well established that the optimal unbiased way to combine image data from array coils is a pixel-by-pixel sum of coil signals, with each signal weighted by the individual coil sensitivity at the location of the pixel. A pragmatic alternative combines the images from the coils as the square root of the sum of squares (SOS), which can reduce the signal-to-noise ratio (SNR) and introduce bias. This work describes how to replace coil sensitivity by an image-derived quantity that enables close to optimal signal combination up to a global intensity scaling. Typical scaling is by an individual coil sensitivity or a linear or SOS combination of the sensitivities of some or all of the coils in the array. The method decreases signal bias, improves SNR when coils have unequal noise levels, and can reduce image artifacts. It can produce phase-corrected data, which eliminates bias completely. In addition, the method allows images from arrays that include highly localized coils, such as a prostate coil and external pelvic array, to be combined with near-optimal SNR and an intensity modulation that makes them easier to view. Copyright 2002 Wiley-Liss, Inc.

Tags: Female; Human; Male; Support, Non-U.S. Gov't

Descriptors: **Magnetic Resonance** Imaging--instrumentation--IS; Equipment Design; Head--anatomy and histology--AH; Image Processing, Computer-Assisted; **Magnetic** Resonance Imaging--methods--MT; Phantoms, Imaging; Prostate--anatomy and histology--AH; Signal Processing, Computer-Assisted; Spine--anatomy and histology--AH

Record Date Created: 20020228
Record Date Completed: 20020509

22/9/6 (Item 6 from file: 155)
DIALOG(R)File 155:MEDLINE(R)

09082110 20379198 PMID: 10918330

Sensitivity profiles from an array of coils for encoding and reconstruction in parallel (SPACE RIP).

Kyriakos W E; Panych L P; Kacher D F; Westin C F; Bao S M; Mulkern R V; Jolesz F A

Department of Radiology, Brigham and Women's Hospital, Boston, Massachusetts 02115, USA.

Magnetic resonance in medicine - official journal of the Society of Magnetic Resonance in Medicine / Society of Magnetic Resonance in Medicine (UNITED STATES) Aug 2000, 44 (2) p301-8, ISSN 0740-3194
Journal Code: 8505245
Document type: Journal Article
Languages: ENGLISH
Main Citation Owner: NLM
Record type: Completed
Subfile: INDEX MEDICUS

A new parallel imaging technique was implemented which can result in reduced image acquisition times in **MRI** . MR data is acquired in parallel using an array of receiver coils and then reconstructed simultaneously with multiple processors. The method requires the initial **estimation** of the 2D **sensitivity** profile of each **coil** used in the receiver array. These sensitivity profiles are then used to partially encode the images of interest. A fraction of the total number of k-space lines is consequently acquired and used in a parallel reconstruction scheme, allowing for a

substantial reduction in scanning and display times. This technique is in the family of parallel acquisition schemes such as simultaneous acquisition of spatial harmonics (SMASH) and sensitivity encoding (SENSE). It extends the use of the SMASH method to allow the placement of the receiver coil array around the object of interest, enabling imaging of any plane within the volume of interest. In addition, this technique permits the arbitrary choice of the set of k-space lines used in the reconstruction and lends itself to parallel reconstruction, hence allowing for real-time rendering. Simulated results with a 16-fold increase in temporal resolution are shown, as are experimental results with a 4-fold increase in temporal resolution. Magn Reson Med 44:301-308, 2000. Copyright 2000 Wiley-Liss, Inc.

Tags: Human

Descriptors: Brain--anatomy and histology--AH; *Image Processing, Computer-Assisted--methods--MT; * **Magnetic Resonance** Imaging--methods --MT; *Thorax--anatomy and histology--AH; Mathematics; Phantoms, Imaging; Sensitivity and Specificity

Record Date Created: 20001019

Record Date Completed: 20001019

22/9/11 (Item 1 from file: 2)

DIALOG(R)File 2:INSPEC

7591572 INSPEC Abstract Number: A2003-10-8760I-059, B2003-05-7510N-112, C2003-05-7330-493

Title: Improved algorithms for image reconstruction from sensitivity encoded data

Author(s): Zhi-Pei Liang

Author Affiliation: Dept. of Electr. & Comput. Eng., Illinois Univ., Urbana, IL, USA

Conference Title: Conference Proceedings. Second Joint EMBS-BMES Conference 2002. 24th Annual International Conference of the Engineering in Medicine and Biology Society. Annual Fall Meeting of the Biomedical Engineering Society (Cat. No.02CH37392) Part vol.2 p.1179-80 vol.2

Publisher: IEEE, Piscataway, NJ, USA

Publication Date: 2002 Country of Publication: USA 3 vol.(lxxxvi+lxiv+2682) pp.

ISBN: 0 7803 7612 9 Material Identity Number: XX-2002-03528

U.S. Copyright Clearance Center Code: 0-7803-7612-9/02/$17.00

Conference Title: Conference Proceedings. Second Joint EMBS-BMES Conference 2002 24th Annual International Conference of the Engineering in Medicine and Biology Society. Annual Fall Meeting of the Biomedical Engineering Society

Conference Date: 23-26 Oct. 2002 Conference Location: Houston, TX, USA

Language: English Document Type: Conference Paper (PA)

Treatment: Theoretical (T)

Abstract: Parallel **magnetic resonance** imaging through sensitivity encoding using multiple receiver coils has emerged as an effective tool to reduce imaging time. However, errors in both the **estimated coil sensitivity** maps and the measured data, and the ill-conditioned nature of the coefficient matrix (often associated with non-localized coils) can degrade image quality significantly, limiting speed enhancements. This paper addresses this problem using wavelet denoising and advanced regularization methods. (4 Refs)

Subfile: A B C

Descriptors: biomedical **MRI** ; coils; image coding; image reconstruction; medical image processing; wavelet transforms

Identifiers: image reconstruction from sensitivity encoded data; improved algorithms; **magnetic resonance** imaging; medical diagnostic imaging;

image quality degradation; wavelet denoising; advanced regularization methods; speed enhancements limiting; coefficient matrix; nonlocalized coils
Class Codes: A8760I (Medical magnetic resonance imaging and spectroscopy) ; A8770E (Patient diagnostic methods and instrumentation); A8740 (Biomagnetism); **B7510N** (Biomedical magnetic resonance imaging and spectroscopy); B6135 (Optical, image and video signal processing); C7330 (Biology and medical computing); C5260B (Computer vision and image processing techniques

22/9/13 (Item 3 from file: 2)
DIALOG(R)File 2:INSPEC

7501870 INSPEC Abstract Number: A2003-04-8760I-039, B2003-02-7510N-090, C2003-02-7330-338
Title: Removing signal intensity inhomogeneity from surface coil MRI **using discrete wavelet transform and wavelet packet**
Author(s): Fa-Hsuan Lin; Ying-Jui Chen; Belliveau, J.W.; Wald, L.L.
Conference Title: 2001 Conference Proceedings of the 23rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society (Cat. No.01CH37272) Part vol.3 p.2793-6 vol.3
Publisher: IEEE, Piscataway, NJ, USA
Publication Date: 2001 Country of Publication: USA 4 vol. 4132 pp.
ISBN: 0 7803 7211 5 Material Identity Number: XX-2002-02147
U.S. Copyright Clearance Center Code: 0-7803-7211-5/01/$17.00
Conference Title: 2001 Conference Proceedings of the 23rd Annual International Conference of the IEEE Engineering n Medicine and Biology Society
Conference Date: 25-28 Oct. 2001 Conference Location: Istanbul, Turkey
Medium: Also available on CD-ROM in PDF format
Language: English Document Type: Conference Paper (PA)
Treatment: Theoretical (T)
Abstract: We evaluate a combined discrete wavelet transform (DWT) and wavelet packet algorithm to improve the homogeneity of **magnetic resonance** imaging when a surface coil is used for reception. The proposed algorithm estimates the spatial sensitivity profile of the surface coil from the original anatomical image and uses this information to normalize the image intensity variations. **Estimation** of the **coil sensitivity** profile based on the wavelet transform of the original image data is found to provide a robust method for removing the slowly varying spatial sensitivity pattern. (15 Refs)
Subfile: A B C
Descriptors: biomedical **MRI** ; coils; discrete wavelet transforms; medical image processing
Identifiers: original anatomical image; slowly varying spatial sensitivity pattern removal; wavelet packet; **magnetic resonance** imaging ; medical diagnostic imaging; image intensity variations normalization; signal-to-noise advantage; surface coil **MRI** ; algorithm
Class Codes: A8760I (Medical magnetic resonance imaging and spectroscopy) ; A8770E (Patient diagnostic methods and instrumentation); A8740 (Biomagnetism); **B7510N** (Biomedical magnetic resonance imaging and spectroscopy); B6135 (Optical, image and video signal processing); B0230 (Integral transforms); C7330 (Biology and medical computing); C5260B (Computer vision and image processing techniques); C1130 (Integral transforms

22/9/18 (Item 1 from file: 5)
DIALOG(R)File 5:Biosis Previews(R)

13311787 BIOSIS NO.: 200100518936
Coil array autocalibration MR imaging .
AUTHOR: Jakob Peter M(a); Sodickson Daniel K; Griswold Mark
AUTHOR ADDRESS: (a)Brookline Village, MA**USA
JOURNAL: Official Gazette of the United States Patent and Trademark Office Patents 1250 (2):pNo Pagination Sep. 11, 2001
MEDIUM: e-file
PATENT NUMBER: US 6289232 PATENT DATE GRANTED: September 11, 2001 20010911
PATENT ASSIGNEE: Beth Israel Deaconess Medical Center, Inc.
PATENT COUNTRY: USA
ISSN: 0098-1133
DOCUMENT TYPE: Patent
RECORD TYPE: Abstract
LANGUAGE: English

ABSTRACT: A **magnetic resonance** (**MR**) **imaging** apparatus and technique exploits spatial information inherent in a surface coil array to increase **MR image** acquisition speed, resolution and/or field of view. **Magnetic resonance** response signals are acquired simultaneously in the component coils of the array and, using an autocalibration procedure, are formed into two or more signals to fill a corresponding number of lines in the signal measurement data matrix. In a Fourier embodiment, lines of the k-space matrix required for image production are formed using a set of separate, preferably linear combinations of the component coil signals to substitute for spatial modulations normally produced by phase encoding gradients. One or a few additional gradients are applied to acquire autocalibration (ACS) signals extending elsewhere in the data space, and the measured signals are fitted to the ACS signals to develop weights or coefficients for filling additional lines of the matrix from each measurement set. The ACS lines may be taken offset from or in a different orientation than the measured signals, for example, between or across the measured lines. Furthermore, they may be acquired at different positions in k-space, may be performed at times before, during or after the principal imaging sequence, and may be selectively acquired to optimized the fitting for a particular tissue region or feature size. The in vivo fitting procedure is readily automated or implemented in hardware, and produces an enhancement of image speed and/or quality even in highly heterogeneous tissue. A dedicated coil assembly automatically performs the calibration procedure and applies it to measured lines to produce multiple correctly spaced output signals. One application of the internal calibration technique to a subencoding imaging process applies the ACS in the central region of a sparse set of measured signals to quickly form a full FOV low resolution image. The full FOV image is then used to **determine coil sensitivity** related information and dealias folded images produced from the sparse set.

MAJOR CONCEPTS: Equipment, Apparatus, Devices and Instrumentation; Radiology (Medical Sciences)
METHODS & EQUIPMENT: coil array autocalibration **magnetic resonance** imaging apparatus--medical equipment, technical description; **magnetic resonance** imaging--Imaging Techniques, imaging method

22/9/26 (Item 6 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)

03514214 E.I. Monthly No: EIM9211-058092
Title: Off-axis B//1 field evaluation: An important consideration when determining surface coil NMR sensitivity for biological tissues at high frequencies.
Author: Smith, Michael B.; Martin, Jack T.
Conference Title: Proceedings of the 13th Annual International Conference of the IEEE Engineering in Medicine and Biology Society
Conference Location: Orlando, FL, USA Conference Date: 19911031
Sponsor: IEEE Engineering in Medicine & Biology Soc
E.I. Conference No.: 17015
Source: Proceedings of the Annual Conference on Engineering in Medicine and Biology v 13 pt 1. Publ by IEEE, IEEE Service Center, Piscataway, NJ, USA (IEEE cat n 91CH3068-4). p 83-84
Publication Year: 1991
CODEN: CEMBAD ISSN: 0589-1019 ISBN: 0-7803-0216-8
Language: English
Document Type: PA; (Conference Paper) Treatment: A; (Applications); X; (Experimental)
Journal Announcement: 9211
Abstract: Calculations are presented which simulate the behavior of RF magnetic field in the human body. Calculations of the RF field for surface coil geometries are performed using finite-element analysis. Solutions are compared at 10 to 200 MHz. At 200 MHz the off-axis displacement currents are comparable to or greater than eddy currents in regions near the coils. These currents increase the RF magnet field strength in this region rather than decrease it as one might expect. On axis, the field intensities are nearly the same. The results show that conclusions regarding coiling sensitivity in the human body based on on-axis **calculations** may underestimate **coil sensitivity** at higher frequencies. Size and physical properties of the tissue increase the total field strength and signal-to-noise ratio. It is concluded that there is a need to examine both on-axis and off-axis fields when evaluating B//1 fields at high frequencies in biological tissues.
Descriptors: BIOLOGICAL MATERIALS--*Tissue; **MAGNETIC RESONANCE** IMAGING; NUCLEAR **MAGNETIC RESONANCE** --Medical Applications
Identifiers: MEDICAL IMAGING; RF MAGNETIC FIELDS; HUMAN BODY; BIOLOGICAL TISSUES; FINITE ELEMENT ANALYSIS; CLINICAL MAGNETS
Classification Codes:
461 (Biotechnology); 462 (Medical Engineering & Equipment)
46 (BIOENGINEERING)

22/9/39 (Item 1 from file: 65)
DIALOG(R)File 65:Inside Conferences

03375731 INSIDE CONFERENCE ITEM ID: CN035652395
RF Coil Sensitivity Estimation for Intensity Correction or Encoding
Kacher, D. F.; Gao, E.; O'Leary, H. M.; Kyriakos, W. E.; Kaufhold, J. P. ; Ma, Q. Y.; Wells, W. M.; Jolesz, F. A.
CONFERENCE: International Society for Magnetic Resonance in Medicine- Scientific meeting; 8th
PROCEEDINGS-INTERNATIONAL SOCIETY FOR MAGNETIC RESONANCE IN MEDICINE, 2000; 8TH; VOLUME 2 P: 1405
ISMRM, 2000
ISSN: 1524-6965
LANGUAGE: English DOCUMENT TYPE: Conference Papers
CONFERENCE SPONSOR: International Society for Magnetic Resonance in

Medicine
CONFERENCE LOCATION: Denver, CO
CONFERENCE DATE: Apr 2000

BRITISH LIBRARY ITEM LOCATION: 6735.830000
NOTE:
Papers in 3 vols, and separate printed programme
DESCRIPTORS: ISMRM; **magnetic resonance** ; medicine

22/9/40 (Item 2 from file: 65)
DIALOG(R)File 65:Inside Conferences

03374972 INSIDE CONFERENCE ITEM ID: CN035644805
Assessment **of the** Sensitivity **of Small** NMR Coils **With a Single-Loop Probe**
Durand, E.; Ginefri, J. C.; Darrasse, L.
CONFERENCE: International Society for Magnetic Resonance in Medicine-Scientific meeting; 8th
PROCEEDINGS-INTERNATIONAL SOCIETY FOR MAGNETIC RESONANCE IN MEDICINE, 2000; 8TH; VOLUME 1 P: 646
ISMRM, 2000
ISSN: 1524-6965
LANGUAGE: English DOCUMENT TYPE: Conference Papers
CONFERENCE SPONSOR: International Society for Magnetic Resonance in Medicine
CONFERENCE LOCATION: Denver, CO
CONFERENCE DATE: Apr 2000

BRITISH LIBRARY ITEM LOCATION: 6735.830000
NOTE:
Papers in 3 vols, and separate printed programme
DESCRIPTORS: ISMRM; **magnetic resonance** ; medicine

22/9/41 (Item 1 from file: 350)
DIALOG(R)File 350:Derwent WPIX

015348025 **Image available**
WPI Acc No: 2003-408963/200339
XRPX Acc No: N03-326225
Magnetic resonance **imaging system includes RF receiving coils that decimate phase encode of received signals and removes folded back signal produced in phase calculation direction**
Patent Assignee: HITACHI MEDICAL CORP (HITR)
Inventor: TAKAHASHI T; TAKIZAWA M
Number of Countries: 026 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
JP 2003079595	A	20030318	JP 2001277891	A	20010913	200339	B
WO 200324327	A1	20030327	WO 2002JP9392	A	20020913	200339	

Priority Applications (No Type Date): JP 2001277891 A 20010913
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
JP 2003079595	A		9	A61B-005/055	
WO 200324327	A1	J		A61B-005/055	

Designated States (National): CN US

Designated States (Regional): AT BE BG CH CY CZ DE DK EE ES FI FR GB GR IE IT LU MC NL PT SE SK TR

Abstract (Basic): JP 2003079595 A

NOVELTY - The RF receiving coils (203-207) arranged in mutually orthogonally direction, receive nuclear **magnetic resonance** signal from examined human body. A reconfiguration unit in coils decimates the phase encode direction by matrix **calculation** using **sensitivity** distribution of the **coil** , to develop the image.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for receiving coil.

USE - Nuclear- **Magnetic resonance** image system.

ADVANTAGE - Performs high speed imaging is arbitrary phase encode directions using suitable receiving coil. Prevents image degradation due to the calculation, by removing folded back signals.

DESCRIPTION OF DRAWING(S) - The figure shows the schematic view of the RF probe.

RF receiving coils (203-207)

pp; 9 DwgNo 2/8

Title Terms: MAGNETIC; RESONANCE; IMAGE; SYSTEM; RF; RECEIVE; COIL; DECIMATE; PHASE; ENCODE; RECEIVE; SIGNAL; REMOVE; FOLD; BACK; SIGNAL; PRODUCE; PHASE; CALCULATE; DIRECTION

Derwent Class: P31; S01; S03; S05

International Patent Class (Main): A61B-005/055

International Patent Class (Additional): G01R-033/34; G01R-033/3415

File Segment: EPI; EngPI

Manual Codes (EPI/S-X): S01-E02A; **S03-E07C** ; **S05-D02B1**

22/9/42 (Item 2 from file: 350)

DIALOG(R)File 350:Derwent WPIX

015148957 **Image available**

WPI Acc No: 2003-209484/200320

XRPX Acc No: N03-166995

Nuclear magnetic resonance **imaging method for medical application, involves computing sensitivity matrix from coil sensitivity image data acquired from local coils adjacent to target**

Patent Assignee: KING K F (KING-I); GE MEDICAL SYSTEMS GLOBAL TECHNOLOGY CO (GENE)

Inventor: KING K F

Number of Countries: 001 Number of Patents: 002

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 20020171422	A1	20021121	US 2001851775	A	20010509	200320	B
US 6559642	B2	20030506	US 2001851775	A	20010509	200338	

Priority Applications (No Type Date): US 2001851775 A 20010509

Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 20020171422	A1		9	G01V-003/00	
US 6559642	B2			G01V-003/00	

Abstract (Basic): US 20020171422 A1

NOVELTY - Calibration data and image data are acquired from N local coils positioned near the patient anatomy, using a pulse train. A **coil sensitivity** image for each **coil** is **calculated** using the calibration images which are reconstructed with the calibration data. A sensitivity matrix (S) is formed from the coil sensitivity images. A proton distribution image is formed based on the sensitivity matrix and

an image that is reconstructed from the image data.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is included for sensitivity matrix formation method.

USE - For acquiring nuclear **magnetic resonance** imaging (**MRI**) data using sensitivity encoding (SENSE) technique, in medical applications.

ADVANTAGE - By using the sensitivity matrix in a sensitivity encoding technique, to reconstruct the **MR image** acquired with the local coils, the image reconstruction time is reduced.

DESCRIPTION OF DRAWING(S) - The figure shows the flowchart explaining the **magnetic resonance** imaging process.

pp; 9 DwgNo 3/3

Title Terms: NUCLEAR; MAGNETIC; RESONANCE; IMAGE; METHOD; MEDICAL; APPLY; COMPUTATION; SENSITIVE; MATRIX; COIL; SENSITIVE; IMAGE; DATA; ACQUIRE; LOCAL; COIL; ADJACENT; TARGET

Derwent Class: S01; S03; S05

International Patent Class (Main): **G01V-003/00**

File Segment: EPI

Manual Codes (EPI/S-X): **S01-E02A2** ; S01-H01; **S03-E07A** ; S05-D02B

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